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FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

ELIMINATION REPORT
FOR
FORMERLY UTILIZED PORTIONS OF
THE WATERTOWN ARSENAL
WATERTOWN, MASSACHUSETTS

Department of Energy
Office of Nuclear Energy
Office of Remedial Action and Waste Technology
Division of Facility and Site Decommissioning Projects

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WATERTOWN ARSENAL
WATERTOWN, MASSACHUSETTS

INTRODUCTION

The purpose of this review is to present information pertaining to work performed under the sponsorship of the Atomic Energy Commission (AEC) Manhattan Engineer District (MED) and the facts and circumstances surrounding activities/events that resulted in the radioactive contamination at the Watertown Arsenal site.

The principal sources of information/documentation assembled for this review were as follows:

a. Three survey reports by the Argonne National Laboratory:

1. DOE/EV-0005/19, "Radiological Survey of the Building Site 421, United States Watertown Arsenal, Watertown, Massachusetts," prepared for U.S. Department of Energy, Assistant Secretary for Environment, Division of Environmental Control Technology, February 1980.

2. DOE/EV-0005/37, "Radiological Survey of the Former Watertown Arsenal Property Site 34 and Site 41, Watertown, Massachusetts," prepared by Argonne National Laboratory, Argonne, Illinois, October 1983.

3. DOE/EV-0005/38, "Radiological Survey of the Former Watertown Arsenal Property GSA Site, Watertown, Massachusetts," prepared by Argonne National Laboratory, Argonne, Illinois; October 1983.

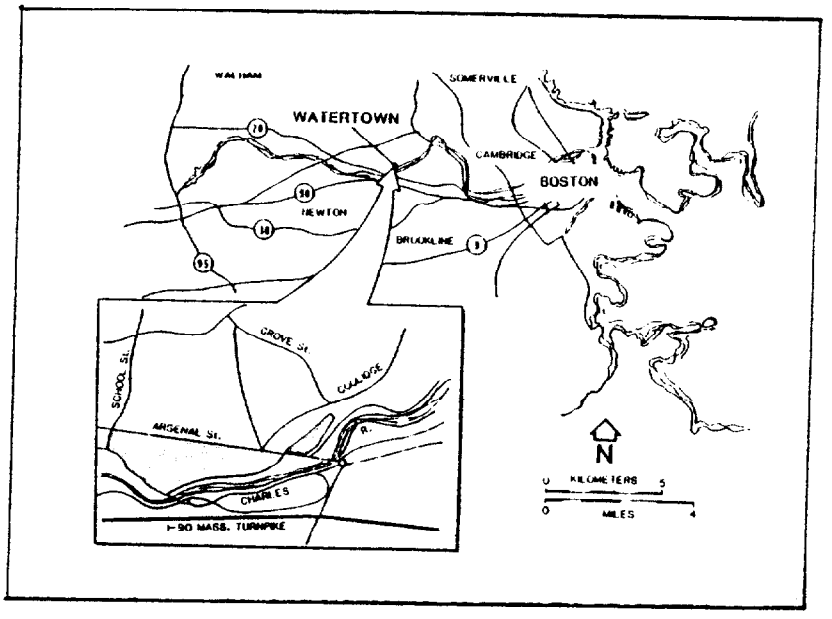
4. U.S. Nuclear Regulatory Commission Materials License records, Docket Number 40-2253.

5. AEC Feed Materials and Raw Materials historical correspondence files from 1949 to 1979.

BACKGROUND

Site Function

From 1946 until 1967, several areas of the Watertown Arsenal were utilized for uranium work. These areas included Buildings 421, 34, 41, and the GSA site (see Figure 1). Some of this work was sponsored by the AEC, and some was performed under license by the Army.



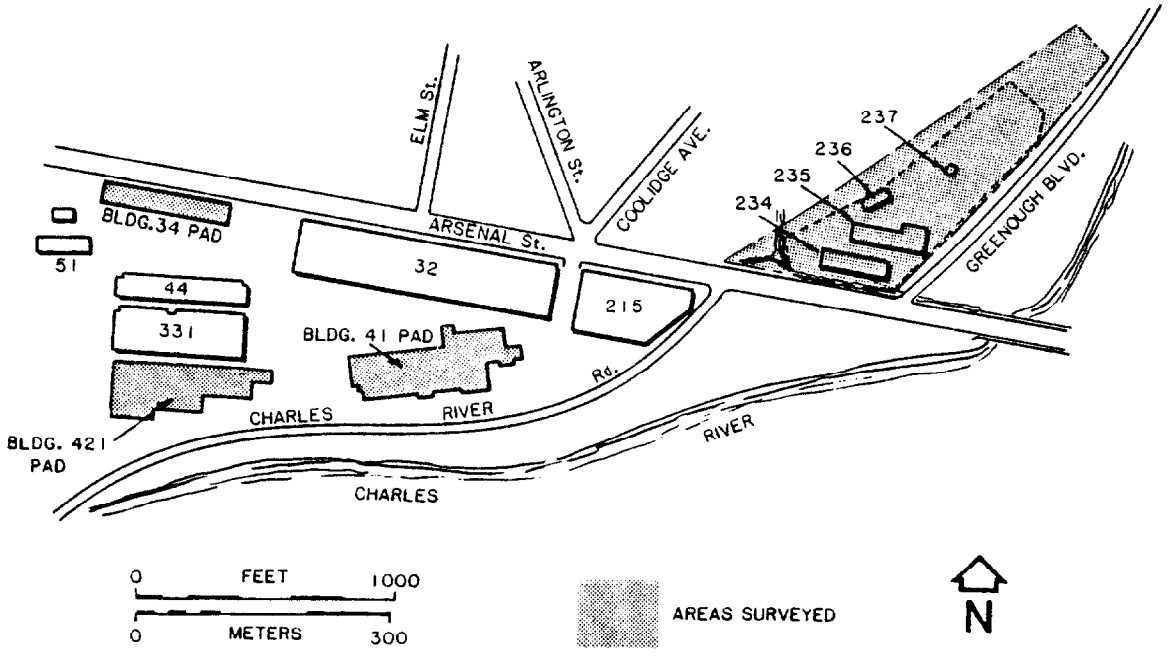


Figure 1. Location of the Former Sites of Buildings 34, 41, 421, and the GSA Site

The Massachusetts Institute of Technology (MIT) operated a laboratory and a uranium ore testing facility at Building 421 for the AEC under contract AT(30-1)-956. A modified ion-exchange technique for production of U_3O_8, which employed a fluidized bed system known as resin-in-pulp, was developed at this site. Initial research on African ores was conducted at MIT in Cambridge and then transferred to Building 421 at the Watertown Arsenal in 1946. MIT conducted the research activities until 1950 at which time American Cyanamid took responsibility for the operations at the site. In 1951, the U.S. Army needed the space utilized by the AEC project, and, in 1953, the AEC's operations were transferred to a new laboratory established for this operation in Winchester, Massachusetts. Building 421 was returned to the Arsenal. The Watertown Arsenal ceased operations in the area of Building 421 in 1967. All that remains of Building 421 is the concrete pad which is approximately 22,630 square meters.

During investigations of Building 421 for the Formerly Utilized Sites Remedial Action Program (FUSRAP), some information relating to the use of uranium at Buildings 34 and 41 and the GSA site were identified. These areas were investigated under the FUSRAP action; however, information identified later indicated that the areas were used for license activities.

The former sites of Buildings 34 and 41 are both located south of Arsenal Street. Building 34 housed a uranium machine shop, and a portion of Building 41 contained a foundry that was used for uranium work. The radiological survey report for these two sites states that only depleted uranium was used in these buildings. Both buildings have been razed and all that remains are the concrete floor slabs, access drives, and underground utility service trenches.

The GSA site is located in an area north of Arsenal Street. The site was used for the packaging and storage of radioactive waste, burning of uranium scrap, and staging of radioactive waste shipments. Argonne National Laboratory's radiological survey report states that only depleted uranium was found at this site. (A small concrete pad remains at the former site of these operations.)

Radiological History and Status

In May 1977, Chicago Operations Office and Argonne National Laboratory personnel completed a comprehensive radiological survey of Building 421 and the surrounding area. Direct instrument surveys of the pad of Building 421 and the south wall of Building 331 (nearest building to the pad) identified three small spots on the pad that exceed the Nuclear Regulatory Commission guidelines of 5,000 dis/min-per 100 square centimeters total for natural uranium.[1]

[1] "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," U.S. Nuclear Regulatory Commission, November 1976.

These readings ranged from 2.2×10^5 dis/min per 100 square centimeters to 8.5×10^4 dis/min per 100 square centimeters. Smears indicated that the contamination was fixed, and the analysis of one sample identified the contamination to be from natural uranium. Other direct instrument measurements taken showed no readings above natural background. Analyses of soil and water samples and measurements of radon in the air gave no indication of radiation above background.

The sites at Buildings 34 and 41 and the GSA site were surveyed by Argonne National Laboratory in 1981. Modest levels of contamination in excess of NRC guidelines[2] were identified by Argonne at both the Building 34 site and the GSA site. No surface contamination was found on the Building 41 concrete pad, however, two-thirds of this pad had been covered with soil up to 4 feet deep at the time of the survey.

Corings taken from the perimeter of sites 34 and 41 identified depleted uranium. One-third of the soil corings taken at site 34 were contaminated, whereas only one of the fourteen corings taken at site 41 was contaminated. The highest levels of soil contamination measured were 16 pCi/g at site 34 and 8.7 pCi/g at site 41, neither of which would be above FUSRAP or NRC Guidelines.

The radiological survey conducted at the GSA site showed no radioactive contamination in the interior of any of the buildings located on the site. Soil corings taken from the area had elevated levels of radioactivity that were determined to be depleted uranium. These measured levels of radioactivity ranged up to 2.6×10^4 pCi/g. Bore holes were also taken and these showed contamination (depleted uranium) as deep as 6 feet and the highest level measured was about 600 pCi/g of uranium at the 2 foot level. These measurements exceed guidelines.

The sites of Buildings 421, 34, and 41 have been turned over to the Watertown Redevelopment Authority. The GSA site is presently under Federal Government control.

ELIMINATION ANALYSIS

This analysis is based on the summary contained in the body of this report and the sample correspondence provided as Attachment 1. In order for a site to be considered for inclusion in the remedial action program, the Department must have the authority to take such action. DOE evaluates each site on the basis of five questions to determine if such authority exists. The following is a summary of the Department's review of these issues.

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[2] "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By-Product Source, or Special Nuclear Material," U.S. Nuclear Regulatory Commission, July 1982.

1. Was the site/operation owned by a DOE predecessor or did a DOE predecessor have significant control over the operations or site?

   Response: Watertown Arsenal was Federally owned, but not by the AEC. Of the areas where contamination was identified, only the area in Building 421 was utilized under leased agreement by the AEC. During the period that AEC work was conducted in Building 421, AEC contractors controlled the activities. Correspondence and license records suggest that the other areas were used only by the Department of the Army.

2. Was a DOE predecessor agency responsible for maintaining or ensuring the health and safety and environment of the site (i.e., were they responsible for cleanup)?

   Response: The AEC had no responsibility for any portion of this site except Building 421, and there is insufficient data to clearly identify AEC's responsibility with regard to the site. The Army personnel at the site and the AEC were both capable of surveying and evaluating the condition of this site prior to transfer. However, no records of final surveys for Building 421 by either the AEC or Army have been identified.

3. Is the waste, residual, or radioactive material on the site the result of DOE predecessor related operations?

   Response: Both the AEC and the Army conducted operations with radioactive materials at this facility. AEC's work was limited to Building 421 and, while it cannot be totally confirmed, the contamination in Building 421 is probably the result of AEC related activities. However, based on license records, the depleted uranium contamination located at Buildings 34 and 41 and the GSA site appear to be the result of the Department of Army licensed activity.

4. Is the site in need of further cleanup and was the site left in unacceptable condition as a result of DOE predecessor related activities?

   Response: Surface contamination at Building 421, Building 34, and the GSA site all exceed surface contamination guidelines in some small isolated areas. All contamination is fixed. It appears that the NRC previously approved the release of Buildings 34 and 41 and the GSA site for unrestricted release on the basis of the licensing authority. No release has been identified for Building 421, however, those areas identified as above guidelines are less than 5,500 square centimeters (0.55 square meters) in area on a pad which is 22,630 square meters.

5. Did the present owner accept responsibility for the site with knowledge of its contaminated condition and that additional remedial measures are necessary before the site is acceptable for unrestricted use by the general public?

   Response: No records were identified that would suggest the present owner had knowledge of contaminated conditions at the site nor are there any records to indicate that the Army or Federal Government (GSA) notified the owners of any potential contamination.

In reviewing the data available on the Watertown Arsenal sites, it appears that only Building Site 421 was involved in the MED/AEC operations. Records assembled to date do not contain any information that would relate the operations conducted at Building Sites 34 and 41 and the GSA site to MED/AEC operations. The contamination was identified as depleted uranium at these three sites; and because no records have been identified that indicate that MED/AEC operations at Watertown involved depleted uranium, no connection can be made between these areas and MED/AEC. Records do indicate that the U.S. Army was involved with depleted uranium and was licensed by the NRC (License #SUB-238) for the use of depleted uranium.

Findings and Recommendations

Although Building 421 was used for the AEC operation under contract number AT(30-1)-956, DOE has determined that there is insufficient evidence that DOE has the authority to conduct remedial action at this site. The sites of Building 34 and 41 and the GSA site were used for licensed work and DOE has no authority for remedial action for these sites.

REFERENCES